COLLAPSIBLE CANOPY AND FRAMEWORK THEREFOR

FIELD OF THE INVENTION

The present invention generally relates to shelters and shade devices which may be used to temporarily shelter against the elements, to provide privacy and the like. More particularly, the present invention relates to a collapsible canopy and the collapsible framework therefor which may be quickly erected for use yet easily collapsed for compact storage. The invention specifically concerns improved fittings that interconnect various structural elements of the framework in this collapsible canopy.

BACKGROUND OF THE INVENTION

Portable shelters have been in existence since pre-historic times. Over the last 20 years, however, there has been a dramatic increase in the sophistication, quality and construction of portable structure apparatus. Examples of such improvements are found in U.S. Patent No. 4,607,656 issued August 26, 1986 to Carter as well as U.S. Patent No. 4,641,676 issued February 10, 1987 to Lynch. Each of these patents discloses a portable canopy structure that has a framework that may be collapsed into a storage state yet which may be expanded and erected for use. The framework includes a plurality of upright support members or legs, and adjacent ones of the upright support members are connected by means of scissor assemblies comprising either a single or dual scissor units connected in end-to-end relation. A flexible covering then extends over the framework. In the Lynch '676 Patent, a central support is also disclosed in the form of a central post so that the covering is supported so that the covering has a peak in order to shed water.

Over the years, also, alternative roof support structures have been proposed for various expandable scissoring canopies. For example, U.S. Patent No. 4,779,635 issued October 25, 1988 to Lynch discloses an expandable canopy including a framework of the type described above. A plurality of roof support members were pivotally connected to one another to define an apex located centrally of the canopy unit with each roof support member projecting radially outward to terminate at a second end pivotally connected at the top end of a respective corner support member. Each roof support member included a pair of extendable sections moveable between a retracted state when the canopy was collapsed and an extended state when the canopy was expanded it was also disclosed in this application that the roof support members could be braced by cantilever members that interconnected the roof support member and the lower sliding bracket on each corner support that was also interconnected to the scissor assemblies. In the exemplary embodiment, the extendable sections were shown to telescope with respect to each other.

In U.S. Patent No. 5,701,923 issued December 30. 1997 to Losi, Jr. et al and U.S. Patent No. 6,035,877 issued March 14, 2000 to Losi, Jr. et al, a roof support structure having roof support members connected at an apex and extending outwardly to the corner supports is disclosed. In these two patents, the two extendable sections of each roof support member are shown to be articulating between the retracted and extended states. Modifications to the edge scissor assemblies of these canopy units are also described in U.S. Patent No. 5,701,923. Here, the scissor assemblies include a linkage that allows additional clearance above the support surface.

A different roof support structure is disclosed in U.S. Patent No. 4,947,884 issued August 14, 1990 to Lynch. Here, the roof support members were pivotally connected at a centrally located center post and extended radially outwardly to be pivotally connected to the lower slide brackets on each corner support member rather than to the top and thereof. These roof members could be a single element or two pieces which moved between an extended and retracted state either by telescoping or by articulating.

A problem experienced by the structures shown in Patent No. '676 (Lynch) and in Patent No. '656 (Carter) as well as many other frameworks for canopy structures is that the edge scissor assemblies extending between the adjacent upright support members are often subjected to lateral forces which tend to decrease their stability. Where the scissor assemblies are connected to each other and to the corner support members, compression mounts were used which, if tightened, inhibited the scissoring action and/or subjected the sheer forces upon lateral deflection. It was often found that the connecting bolts could be bent or broken by excessive lateral deflections.

In order to improve the stability of these scissoring canopy structures, a significant improvement was set forth in U.S. Patent No. 5,244,001 issued September 14, 1993 to Lynch. In this patent, an expandable framework is disclosed wherein a plurality of upright support members is again provided. Scissor assemblies are provided to interconnect adjacent ones of the support members. The outer ends of the edge scissor assemblies are pivotally secured to the uprights to adjacent ones of the support members by mounts that are disposed on the upright support member. The mounts are disclosed to have sockets formed therein by spaced apart parallel sidewall portions, and the outer end portions of the edge

scissor assemblies are rectangular in cross section and are received in the respective ones of the sockets in close-fitted engagement. The edge scissor assembly itself was disclosed to be constructed by two scissoring units, the interconnected ends of the scissoring units were secured by floating mounts that also provided sockets for rectangular ends of the units.

While the mounts shown in the '001 Patent provide an elegant solution to the interconnection of the various components making up a quick erect collapsible/expandable canopy, the mounts can be somewhat bulky and costly to manufacture. Therefore, there is a need for improved mounting structures for use with any of these canopy shelters.

OBJECTS OF THE INVENTION

It is an object of the present invention to provide new and useful fittings to interconnect the various components of a canopy framework.

It is another object of the present invention to provide a canopy framework incorporating improved fittings that reduce cost while providing sufficient sturdiness and lateral stability during use.

Yet another object of the present invention is to provide a canopy incorporating the framework and fittings so as to reduce the overall cost of the canopy shelter while maintaining the integrity thereof.

According to the present invention, then, an expandable framework is provided as well as a canopy which utilizes this framework. The expandable framework is adapted to move between an expanded state for supporting a canopy covering above a support surface and collapsed state for storage. Broadly, the expandable framework includes a plurality of upright support members each having an bottom end portion positionable on the support surface and a top end portion

opposite the bottom end. The support members are oriented alongside one another when in the collapsed state yet are spaced apart from one another when in the expanded state. A plurality of edge scissor assemblies are provided with there being an edge scissor assembly interconnecting peripherally adjacent ones of the upright support members. The edge scissor assemblies are operative to open and close whereby the expandable framework may move between the expanded and collapsed states.

Upper and lower mounts are disposed on each upright support member with at least some of the upper and lower mounts including a lobe having outwardly facing, spaced apart and substantially parallel sidewalls. Each edge scissor assembly includes a pair of outer upper ends and a pair of outer lower ends. At least some of the outer upper ends and at least some of the outer lower ends are provided with a socket fitting. The socket fitting includes spaced apart portions that are spaced apart from one another to define a channel opening therebetween that is adapted to mateably engage a respective said lobe in close-fitted engagement, and with at least one of said portions having a substantially flat face thereby to form sliding contact surface with the respective lobe. For example, in the disclosed embodiments, spaced apart first and second arm portions extend for a length and have substantially parallel-opposed faces to define the channel opening therebetween. This channel opening is sized and adapted to mateably receive a respective lobe in close fitted engagement so that the faces form a pair of sliding contact surfaces with the lobe. A fastener then secures each lobe for pivotal movement in the respective socket fitting.

In the disclosed embodiments, a pair of upper and lower mounts are disposed on each of the upright support members. One of the pair is a stationary mount and

the other of the pair is a slide mount that is slideably secured to the upright support member and moveable therealong between locations proximate to and remote from the stationary mount when the respective edge scissor assembly opens and closes. In the disclosed embodiments, the upper mount of each pair is the stationary mount. A latch element may be then associated with each of the upright support members. This latch element is operative to latch the respective slide mounts in the location proximate to the stationary mount.

Also in the disclosed embodiments, a roof support assembly is supported above the support surface by the upright support members when in the expanded state, and this roof support assembly is operative to support a canopy covering. Several different embodiments of the roof support assembly are discussed. In one embodiment, the roof support assembly includes a plurality of roof support members that are pivotally connected to one another at proximate ends thereof to form an apex. The plurality of roof support members extends generally radially outwardly from one another when in the expanded state. Here, each roof support member is pivotally connected at a distal end thereof to one of the mounts on a respective upright support member. In this embodiments, the roof support members can, if necessary, include a pair of extendable sections moveable between a retracted state when the framework structure is in the collapsed state and an extended state when the framework structure is in the expanded state. A roof latch element may be associated with the extendable sections of the roof support member with the roof latch element operative to retain the extendable sections in the extended state.

Here, the extended sections may telescope with respect to one another. Alternatively, the extendable sections may fold with respect to one another. Moreover, the roof support assembly can include a apex cap member centrally

disposed with respect to the framework structure. The proximate ends of the roof support members are pivotally secured, then, to the apex cap member. Also, a cantilever section may be provided with a cantilever end pivotally connected at a first cantilever end to the roof support member and at a second cantilever end to slide mount on a respective support member.

In another embodiment, the roof support assembly includes at least one central scissor assembly that extends apart across the central region of the framework when in the expanded state. Intersecting central scissor assemblies are shown. A center pole may be provided to hold up a central area of the canopy covering.

The edge scissor assemblies, if desired, can include a pair of scissor units connected at upper and lower inner ends thereof in end-to-end relation. In this embodiment, an upper center fitting interconnects the upper ends of the scissor units together and a lower center fitting interconnects the lower ends of the scissor unit together. Each of the upper and lower center fittings include oppositely projecting fitting lobes. The upper and lower inner ends of the scissor units are then provided with a socket fitting wherein the socket fitting includes spaced apart first and second arm portions that have substantially opposed face portions defining a channel opening therebetween. This channel opening has been adapted to mateably receive a respective fitting lobe of a respective one of the upper and lower center fittings in close fitted engagement thereby to form sliding contact surfaces therewith. The socket fittings can be constructed identically to the socket fittings that connect to the mounts on the upright supports.

The scissor units, or, the edge scissor assemblies where one scissor unit is used, may be constructed by at least one pair of scissor bars pivotally connected to

one another, for example, at a central region thereof. The scissor bars are described to be tubular members which have a cross-section selected from a group consisting of ovals, rectangles (including squares) and circles.

In one embodiment, the socket fittings can include a web portion extending between the first and second arm portions for at least a portion of the length thereof in order to rigidify the arm portions. In the disclosed embodiment, the web portion extends the entire length of the arm portions. Modifications are also shown to the lobes on the mounts. In one embodiment, the lobe can be a simple blade. Alternatively, the lobe can be T-shaped in cross-section so as to have a blade portion sized and adapted to be mateably received in the channel of a respective socket fitting. The lobe then also can have a reinforcing web that extends transversely of the blade portion in order to rigidify the blade portion. In yet another embodiment, some of the mounts may have a plurality of lobes disposed thereon. A reinforcing connector web may extend between these plurality of lobes.

As noted, the framework described above can be used to form an expandable canopy that is adapted to be erected on a support surface. This canopy can have any of the structure described above and further includes a canopy covering that is sized and adapted to extend across the framework and be supported by the roof support assembly when the framework is in the expanded state. Here, also, side panels can be employed which are also supported by the framework.

These and other objects of the present invention will become more readily appreciated and understood from a consideration of the following detailed description of the exemplary embodiments of the present invention when taken together with the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a prospective view of a cabana style canopy according to a first exemplary embodiment of the present invention;

Figure 2 is a prospective view of the framework of the cabana style canopy shown in Figure 1 illustrated in the expanded state;

Figure 3 is a side view in elevation showing the framework of Figure 2 in an intermediate state between full expansion and full collapse;

Figure 4 is a side view in elevation showing the canopy framework of Figures 2 and 3 in a collapsed state;

Figure 5 is a side view in elevation showing a representative roof support structure used with the canopy framework of Figures 2-4;

Figure 6 is an enlarged view showing a representative upright support member and fittings according to a first exemplary embodiment of the present invention;

Figure 7 is a side view in elevation showing the upper, fixed fitting of Figure 6;

Figure 8 is a top plan view of the upper fitting shown in Figure 7;

Figure 9 is top plan view showing the lower slide fitting of Figure 7;

Figure 10 is perspective view of a socket fitting according to a first exemplary embodiment of the present invention for use with the scissor bars and roof support members;

Figure 11 is an end view in elevation of the fitting shown in Figure 10 for connection to an oval tubular scissor member or roof support piece;

Figure 12 is a top plan view showing the upper fixed mount of Figure 7 interconnected to a pair of upper ends of its associated scissor assemblies;

Figure 13 is a side view in elevation of the structure shown in Figure 12;

Figure 14 is a top plan view showing the slide mount of Figure 9 connected to the lower ends of its associated scissor bars and to a roof support bar using the fitting of Figure 10;

Figure 15 is a side view in elevation showing the interconnection of a roof support bar to a roof support cap according to the present invention;

Figure 16 is an end view in elevation, similar to Figure 11 but showing the construction of the fitting of Figure 10 for a circular cross-section tube;

Figure 17 is an end view in elevation, similar to Figures 11 showing the end of a fitting of figure 10 constructed for use with a square shaped strut;

Figure 18 is a side view in elevation showing a framework, similar to Figure 2, but wherein each scissor assembly is formed by a pair of scissor units and wherein the roof support structure is extendable;

Figure 19 is a side view in elevation showing a telescoping roof support member that may be used with the frameworks of Figures 2 or 16 according to the present invention;

Figure 20 is a top plan view showing a center fitting used to interconnect the inner ends of two scissor units together to form a scissor assembly;

Figure 21 is a side view in elevation showing an alternative, articulating roof support member in a partially collapsed state;

Figure 22 is a side view in elevation, similar to Figure 21, but showing an alternative roof support member in an extended state;

Figure 23 is perspective view of an alternative framework on which the mounts and fittings of the present invention may be incorporated wherein the roof support structure extends primarily from the tops of the upright support members;

Figure 24 is a perspective view showing the connection of an extendable roof support member to the upright corner support of the framework of Figure 23;

Figure 25 is a top plan view of the upper fixed fitting according to the present invention used on the framework of Figure 23;

Figure 26 is a top plan view of the lower slide fitting according to the present invention used on the framework of Figure 23;

Figure 27 is perspective view of another alternative framework on which the mounts and fittings of the present invention may be incorporated wherein the roof support structure is formed by scissor assemblies;

Figure 28 is a top plan view of the intermediate floating according to the present invention used on the framework of Figure 27 to interconnect two scissor units to form an edge scissor assembly and to connect to the roof supporting scissor units;

Figure 29 is a top plan view of a representative roof pole fitting used on the framework of Figure 27;

Figure 30 is perspective view of another alternative framework on which the mounts and fittings of the present invention may be incorporated to illustrate how canopies having larger coverage may be constructed;

Figure 31 is a perspective view of an alternative embodiment of the upper fixed fitting similar to the type illustrated in Figures 7 and 8 according to the present invention;

Figure 32 is a perspective view of another alternative embodiment of the upper fixed fitting similar to the type illustrated in Figures 7 and 8 according to the present invention;

Figure 33 is a perspective view of an alternative embodiment of the socket fitting similar to the type illustrated in Figure 10 according to the present invention; and

Figure 34 is a perspective view of an alternative embodiment of the lower slide fitting similar to the type illustrated in Figure 9 according to the present invention.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIEMENTS

The present invention is broadly directed to canopy structures that form shelters or shade devices to temporarily protect users against the elements, to provide privacy and the like. In addition, the present invention is directed to framework assemblies that support canopy coverings for such canopies. This invention specifically concerns fittings that interconnect various structural elements of the framework in a collapsible canopy.

To introduce this invention, a representative canopy 10 is shown in Figure 1 as well as a framework 12 for such canopy as is shown in Figure 2. In each of these figures, canopy 10 and framework 12 are depicted in a fully erected state. As is shown, framework 12 includes a plurality of upright supports 14 that form legs disposed at each corner of canopy 10. Upright supports 14 have bottom end portions 15 positionable on a support surface and opposite top end portions 17. Each of upright supports 14 is formed by a pair of telescoping sections 16 and 18 so that the effective height of framework 12 and, thus, canopy 10, may be selectively varied. As is shown in Figure 1, a flexible covering 20 extends over the top of framework 12 to provide shade and shelter. In addition, side panels 22 may optionally be provided, and an opening may be formed through side panels 22' by means of a closure 24.

It should be understood that canopy framework 12 may be erected to an expanded state shown in Figures 1 and 2 or may be collapsed through an intermediate stage shown in Figure 3 to a fully collapsed state shown in Figure 4 in order to facilitate storage of canopy 10. In the collapsed state, support members 14 are oriented alongside one another; in the expanded state, they are spaced-apart from one another. To accomplish this, peripherally adjacent ones of uprights supports 14 are interconnected by means of a scissor assembly which, as is shown in Figures 2-4, is a single scissor unit 26. Each scissor unit 26 is formed by a pair of pivotally connected scissor bars 28 and 30 which are pivotally connected to supports 14 by upper mounts in the form of fixed fittings 32 and by slide mounts in the form of fittings 34 as hereinafter described. The outer upper ends of each scissor assembly is connected to a respective fixed fitting 32 while the outer lower ends of each scissor assembly is connected to a respective slide fitting 34.

Covering 20 forms a top for canopy 10 and is supported at its apex by means of a roof support dome or cap 36 that is interconnected to upright supports 14 by means of roof support members 38 which, in this embodiment, are each formed by a single bar. Roof support members 38 are pivotally connected at their proximal ends to cap 36, as is shown in Figure 5. Each roof support member 38 then extends radially from cap 36. In this embodiment, the opposite or distal end of each roof support member 38 is pivotally connected to slide fitting 34. With reference again to figure 2, it may be seen that four such roof support members 38 are provided corresponding to each of the four upright supports 14. Covering 20 includes a central portion 40 and a plurality of side skirts 42 that depended downwardly along the side of framework 12 when in the erect state, as is shown in Figure 1.

An important aspect of the present invention resides in the construction of the fittings which interconnect the scissor assemblies and the roof support assemblies to the upright supports. Moreover, except for the construction of dome cap 36 and these fittings, the structure of canopy 10 and framework 12 is substantially the same as that shown in U.S. Patent No. 4,947,884, the disclosure of which is hereby incorporated by reference.

By way of introduction to the structure of fittings 32 and 34, reference is made to Figure 6 where it may be seen that upper fitting 32 forms a cap on upper section 16 of upright support 14. Upper fitting 32 includes a pair of generally rigid lobes 44 which are generally oriented at right angles with respect to one another. The structure of upper fitting 32, however, may be more fully appreciated in reference to Figures 7 and 8. Here, it may be seen that fitting 32 includes a central body 46 that includes a square shaped cavity 48 (shown in phantom). Cavity 48 is sized and adapted to be press fit or otherwise affixed to the upper end of upright support 14. Here, cavity 48 is square in cross section to mate with the square shaped cross section of upright support 14. It should be understood, however, that other cross-sectional geometries for upright support 14 are within the scope of this invention such that the cross-section of cavity 48 should be such as to mate with the geometry of the upright support.

As is shown in Figure 8, each of lobes 44 is off-set with respect to axes "X" and "Y". This is done to accommodate the thickness of the scissor units 26 and, specifically, the off-set nature of scissor bars 28 and 30. In any event, each of lobes 44 is provided with a transverse bore 50 extending therethrough to accommodate the mounting of the scissor units thereto. Lobes 44 have outward, substantially

parallel sidewalls 45 that are spaced apart to define a thickness for lobe 44 that, as is shown, is approximately 1/3 of the dimension of one side of fitting 32.

A top plan view of slide fitting 34 is best shown in Figure 9. Here is may be seen that slide fitting 34 includes a central body 52 which has a passageway 54 extending therethrough so that slide bracket 34 may freely slide on section 16 of upright support 14. Slide fitting 34 includes a pair of lobes 56 that are substantially rigid and are generally oriented at right angles to one another. Lobes 56 are provided with bores 58 and are offset from axes "S" and "T", again to accommodate the mounting of scissor units 26. In addition, slide-fitting 32 includes a lobe 60 disposed between lobes 58 in order to connect to a roof support member 38. To this end, lobe 60 includes a bore 62 to accommodate mounting of this roof support member. Lobes 56 have outer sidewalls 57 that define a thickness that is approximately 1/3 the side dimension of slide fitting 34. Lobe 60 has outer faces 61 that are generally parallel to one another and have a thickness similar to lobes 56 and 44. Ramp structure 59 is provided to engage button latch 61 to facilitate sliding movement of slide bracket 34 into a latched state where it can retain the slide mount in a location proximate to the upper mount but can release to allow the slide mount to move to a location more remote from the upper mount as the scissor assemblies close. Each of fittings 32 and 34 are, for example, injection molded out of stiff, durable plastic such as nylon 66 or other suitable material.

As is best shown in Figures 6,10 and 12-14, each of lobes 44, 56 and 60 are constructed to engage a socket fitting that has portions that are spaced apart from one another to define a channel opening therebetween with at least one of said portions having a substantially flat face thereby to form sliding contact surface with the respective said lobe. Specifically, in this embodiment, socket fitting 64 is formed

by a main body 66 and a pair of arms 70 that define a channel or cavity therebetween that is adapted to mateably engage a respective said lobe in close-fitted engagement. With this particular construction, a socket 68 is bounded by main body 66 as well as faces 71 of arms 70 that are substantially parallel, spaced apart relationship from one another a distance that is only slightly more than the thickness of lobes 44, 56 and 60. Each of arms 70 is provided with a bore 72, and bores 72 register with a respective bore 50,58 and 62 in order to mount socket fittings 64 for pivotal motion on a respective lobe. To this end, pins 74 serve to pivotally connect each socket fitting 64 to its respective lobe.

Each of socket fittings 64 is constructed of strong, durable rigid plastic, again such as nylon 66 or other suitable material, and it should be understood that, when mounted, faces 71 are, respectively, in sliding pivotal contact with flat faces 45, 57 and 61. This sliding contact, along with the relative rigidity of the lobes and arms help resist lateral deflection and torsional movement, especially for scissor units 26.. This helps stabilize and rigidify framework 12 during use.

In order to connect scissor bars 28 and 30 of scissor units 26 to respective ones of socket fittings 64, main body 66 of socket fitting 64 is provided with a cavity to receive and to mount an end of scissor bars 28, 20 therein. As is shown in Figure 11, cavity 76 is preferably oval in cross-section and, it should be understood, that scissor bars 28 and 30, in this embodiment are desirably hollow tubular metal bars that have an oval cross-section. With reference, though, to Figures 16 and 17, it should be appreciated that other cross-sections are within the scope of this invention. These cross-sections include, for example, square and non-square rectangles, circles or any other convenient geometry. For example, in Figure 16, it may be seen that socket fitting 164 has a cavity 176 that is constructed to receive a

tubular member that is circular in cross-section. In Figure 17, socket-fitting 264 includes a cavity 276 of square cross-section to receive a square shaped tubular member. The tubular members which form scissor bars 28 and 30 may be formed, for example, of steel, aluminum, fiberglass, plastic or other similar materials.

With reference now to Figure 15, it may also be seen that a socket fitting 64 is used to pivotally connect roof support member 38 to dome cap 36. To this end, dome cap 36 includes four downwardly depending lobes or tabs 78 which are dimensioned for close fitted engagement in socket 68 of the respective socket fitting 64. Here, again, tab 78 is sized for closed fitted pivotal motion in the socket 689 between arms 70. Tab 78 is constructed to have two substantially flat faces 79 that are spaced a distance apart substantially the same as the distance between the space 71 of socket fitting 64. Tabs 78 are oriented at an angle so that these faces 79 extend radially towards corner upright supports 14. Tabs 78 are provided with holes 80 in order to receive a pin 82 that interconnects the respective socket fitting 64 thereto.

While the above structure has been described with respect to a canopy framework 12 that includes a single scissor unit 26 which forms a scissor assembly, it should be understood that larger frameworks may be created using the fittings 32, 34, and 64. Thus, for example, as is shown in Figure 18, a framework 112 may be created wherein two scissor units 126 are connected end-to-end to form a scissor assembly 127. Scissor assemblies 127 then interconnect adjacent ones of upright supports 114. Here, again, roof supports 138 extend radially outwardly from dome cap 136 and are connected to slide fittings 134 on each upright 114. Scissor assemblies 127 have their outer upper ends connected to fittings 132 on the upper

corners of upright supports 114 while scissor assemblies 127 have their lower outer corners connected to slide brackets 134.

The connection of the scissor assemblies 127 to fittings 132 and 134 are the same as that described with respect to canopy framework 12. Likewise, the connection of roof support members 138 to dome cap 136 and to fittings 134 is the same as that described with framework 12. Further, it should be understood that the construction of each of fittings 132 and 134 as well as each scissor unit 126 and a dome cap 136 correspond to that described with respect to fittings 32 and 34, cap 36 and scissor units 26. However, the construction of roof support 138 must be different than that of roof support 138 if framework 112 is to collapse without an excessive extension of the roof apex.

To this end, as is shown in Figure 19, roof support 138 is formed by a pair of extendable sections such as telescoping sections 140 and 142 which may be extended and contracted with respect to each other. When in the extended state, a roof latch element such as button latch 144 is provided to maintain the extendable sections of roof support 138 in the extended position. To erect framework 112 from a collapsed state, not shown, but similarly to that shown in Figure 4, the user first extends roof support member 138 by telescoping extending sections 142 and 140 until they are latched with respect to one another by button latch 144. Upright supports 114 within moved apart from one another so that framework expands due to the scissoring action of scissor assemblies 127. Canopy covering is placed over framework 112. In order to collapse canopy framework 112 the process is reversed.

It should be understood that, in order to ensure correct alignment of telescoping sections 140 and 142, it is desirable that they not rotate with one another. To this end, a non-circular geometry is preferred for the cross-section of

these two telescoping pieces. Such cross-sections can well be oval or rectangular (including square). Furthermore, it is highly desirable that the roof support members be constructed of a resilient material, such as fiberglass or plastic. Where the telescoping roof supports are constructed of metal, stresses on the canopy can cause slight bending in telescoping members 140 and 142 which may ultimately interfere with smooth telescoping extension and contraction.

Also, since the framework 112 includes two scissor units 126 connected in relation, it is helpful to have a center fitting that will mate with socket fittings 164. Thus, as is shown in Figure 20, center fitting 133 is provided to have a central portion 135 from which a pair of staggered lobes 137 project. Lobes 137 are provided with faces 145 that are in sliding contact with faces 71 on arms 70 of socket fitting 64. Each of lobes 137 as provided with a bore 150 so as to receive a pin 74 therethrough.

Also, it should be understood that other extendable sections may be used to create a roof support structure for the canopy framework 112. Thus for example as is shown in Figures 21 and 22 a roof support member 138' is formed by a pair of extendable sections in the form of foldable sections 140' and 142' which are pivotally connected at a central pivot 143. Sleeve 144' may slide over the hinge point 143 when in the extended position, as is shown in Figure 22, to lock sections 140' and 142' in the extended state and thus provides a roof support latch. Sleeve 144' may be slid onto section 142' to allow roof support member 138' to pivot toward the collapsed state shown in Figure 21.

Fittings similar to those described with respect to canopy frameworks 12 and 112 may be employed with other types of canopy frameworks as well. For example, as is shown in Figure 23, canopy framework 212 employs a pair of scissor units 226

to construct a scissor assembly 227 in the manner described with respect to scissor assembly 127. Again, upright corner support members 214 are provided with adjacent ones of supports 214 being interconnected by a scissor assembly 227. To this end, the outer upper ends of each scissor assembly 227 is connected to an upper fitting 232 while the outer lower ends are connected to a slide fitting 234.

Canopy framework 212 shown in Figure 23 is similar to that shown in U.S. Patent No. 4,779,635, the disclosure of which is specifically incorporated herein by reference. However, the fittings used to interconnect the scissor assemblies and the roof support assembly is different then that described in '635 patent.

Here, upper fitting 232 is best shown in Figure 25 and includes a central body 246 having a cavity 248 formed partially therethrough so as to receive the upper end of corner support member 214. A pair of lobes 244 extend at generally right angles to each other and are substantially the same as lobes 44 of fitting 32 described above. Here, however, upper fitting 232 has a roof support lobe 260 that is similar to lobe 60 on slide fitting 34, above. Lobe 260 serves to interconnect a roof support member 238 (Fig. 24).

Slide fitting 234 is shown in Figure 26 and includes a central body 252 having a passageway 254 therethrough. Passageway 254 is again sized for sliding motion on corner upright support 214. A pair of lobes 256 project at generally right angles to one another and, as noted above, serve to connect the lower outer corners or scissor assemblies 227. A ramp structure 255 is again provided to accommodate button latch 257.

With reference to Figures 23 and 24, it may be seen that a roof support member 238 is provided and is formed by a pair of telescoping sections 240 and 242. Each roof support member 238 extends radially outwardly from an apex formed

by dome cap 236 which is constructed similarly to dome cap 36. Roof support members 238 are structures substantially identical to roof support structure 138, so this structure is not again repeated. Here, however, the roof support member 238 is connected to a corner fitting 232. A cantilever section in the form of cantilever member 239 is pivotally connected at one end to a central portion of roof support member 238 and at a second, opposite end to slide mount 234. Also, with reference to figure 23, it may be seen that central fittings 140 are again provided to connect the inner ends of each scissor unit 226.

The fittings of the present invention can also be used to create the canopy structure similar to that described in U.S. Patent No. 5,244,001, the disclosure of which is hereby incorporated by reference. As is shown in Figure 27, in this embodiment canopy framework 312 is formed by four upright corner supports 314 of which adjacent ones are interconnected by means of scissor assemblies 327 each formed by a pair of scissor units 326. A center pole 315 is supported by central scissor assemblies each formed by a scissor unit 329.

To create this unit, the upper fittings 332 are constructed the same as fitting 32 shown in Figures 7 and 8. Slide fittings 334 are identical to slide fitting 232 shown in Figure 26. However, in order to interconnect scissor units 326 in end-to-end relationship, an intermediate fitting 350 is provided. Intermediate fitting 350 includes a central body 352 having a pair of oppositely extending, offset lobes 354 similar to each of the lobes described above with respect to the previous embodiments. Lobes 354 serve to interconnect the upper and lower inner ends of adjacent scissor units 326 a lobs 356 projects generally perpendicularly to each of lobes 354 and serves to connect the outer upper and lower ends of a scissor unit 329 to the junction of pair of scissor units 326.

In order to connect the inner ends of scissor units 329, a center pole fitting 360 is fabricated. Center pole fitting 360 includes a central body 362 having a passageway 364 formed therethrough. A plurality of lobes 366 project outwardly from central body 362 and serve to connect the inner ends of scissor units 329 centrally of framework 312. Passageway 364 is provided to accommodate center pole 315 for sliding movement. Lower central fitting 370 is constructed substantially identical to fitting 360 except that passageway 364 may be closed at one end to support the lower end of center pole 315.

With the above structures in mind, it should be further appreciated that larger area canopies can be created, such as that shown in Figure 30. Here, canopy framework 412 is essentially, a pair of frameworks 312 connected end to end. Thus, framework portions 413 share a common upright support 414' but, in other respects, the structure is the same as that described with respect to framework 312 so that the structure is not again repeated.

Modifications may be made to the various fittings described above either to increase strength or the reduce thicknesses or to avoid interference between the canopy framework as it pivots between the collapsed and the extended states. For example, as is shown in Figure 31, a representative fitting 532 is shown. Here, lobes 544 are T-shaped in cross-section and are formed by a blade 546 that has a reduced thickness but that is re-enforced by a transverse reinforcing upper web 548 so that it maintains its rigidity during use. Likewise, as is shown in Figure 32, representative bracket 534 includes a pair of blades 556 which are joined by an arcuate connector web 558 which serves to reinforce the blade portions 556 of the lobes which again are reduced in cross-section. These structures allow use, for example, with a modified socket fitting 564, shown in Figure 33. Fitting 564 is substantially identical

to fitting 64 except that arm portions 570 are joined by a web portion 572 for at least a portion, if not the entire length, of arm portions 570. This acts to further rigidify socket 568 formed between arm portions 570. Similar modifications could be made to any of the fittings described above.

Finally, due to the possible interference of the structure during the expansion and contraction, it is possible to offset the roof support lobe from the scissor assembly lobe. Thus, for example, in representative socket 634, central body 652 has a pair of lobes 656 which project generally perpendicularly to one another along a lower edge 653 of central body 652. Roof support lobe 660 is intermediate of lobes 656 in its direction of projection, but is vertically offset so as to be adjacent to edge 655 of central body 652. Again, a similar modification could be made to any of the fittings described above.

From the above-described structures, the ordinarily skilled artisan in the field of canopy construction should appreciate that a wide variety of canopies may be conveniently assembled using the fittings and structural members described herein. It should be appreciated that the scissor bars of each of the scissor units may be constructed of any suitable material and of any suitable cross-section. Likewise, the roof support members may be made of any suitable material or cross-section as can the upright corner or intermediate supports. The inventive concepts likewise may be used with varying roof support structures as well as to apex supports constructed as domes or center poles. Modifications to the scissor assemblies as presently exist or as hereinafter may be developed may be made employing the fittings of this invention.

Accordingly, the present invention has been described with some degree of particularity directed to the exemplary embodiments of the present invention. It

should be appreciated, though, that the present invention is defined by the following claims construed in light of the prior art so that modifications or changes may be made to the exemplary embodiments of the present invention without departing from the inventive concepts contained herein.